

Ser. No. 07/931,554, filed Aug. 18, 1992 AB which, in turn, was a continuation of application Ser. No. 07/560,514 filed Jul. 31, 1990 AB.

AMENDMENTS TO THE ABSTRACT:

Please substitute the following amended paragraph for the Abstract:

The invention provides self-clocking glyph shape codes for encoding digital data in the shapes of glyphs that are suitable for printing on hardcopy recording media. Advantageously, the glyphs are selected so that they tend not to degrade into each other when they are degraded and/or distorted as a result, for example, of being photocopied, transmitted via facsimile, and/or scanned-in to an electronic document processing system. Moreover, for at least some applications, the glyphs desirably are composed of printed pixel patterns containing nearly the same number of ON pixels and nearly the same number of OFF pixels, such that the code that is rendered by printing such glyphs on substantially uniformly spaced centers appears to have a generally uniform texture. In the case of codes printed at higher spatial densities, this texture is likely to be perceived as a generally uniform gray tone. [Binary image processing and convolution filtering techniques for decoding such codes also are disclosed, but this application focuses on the codes.]

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims.

IN THE CLAIMS:

1. A method for storing digital values of predetermined bit length, n , in a machine readable format on a hardcopy recording medium, said method comprising the steps of
encoding each of said digital values in a corresponding one of 2^n physically distinct, distinctive, rotationally variant, substantially equal surface area, individually discriminable glyph shapes to generate a set of mutually independent glyph shapes that vary in accordance with said digital values; and
writing said set of glyph shapes on said recording medium in a predetermined logical

order and in accordance with a predetermined spatial formatting pattern for storing said digital values in a self-clocking code.

2. The method of claim 1 wherein said digital values are single bit values, and said glyph shapes are elongated along axes that are tilted at angles of approximately plus and minus 45° with respect to a reference axis for distinguishing different ones of said digital values from each other.

3. The method of claim 2 wherein said reference axis extends substantially horizontally with respect to said recording medium.

4. A method for storing digital values of predetermined bit length, n , in a machine readable format on a hardcopy recording medium, said method comprising the steps of encoding each of said digital values in a corresponding one of 2^n physically distinct, distinctive, rotationally invariant, substantially equal surface area, individually discriminable glyph shapes to generate a set of mutually independent glyph shapes that vary in accordance with said digital values; and writing said set of glyph shapes on said recording medium in a predetermined logical order and in accordance with a predetermined spatial formatting pattern for storing said digital values in a self-clocking code.

5. The method of any of claims 1-4 wherein said glyph shapes are defined by respective two dimensional pixel arrays of predetermined size, each of which contains a predetermined number of ON pixels and a predetermined number of OFF pixels, and said spatial pattern is spatially periodic.

6. The method of claim 5 wherein
said pixel arrays are written on said recording medium in spatially abutting relationship,
such that said code has a generally uniform, textured appearance.

7. The method of any of claims 1-4 wherein
said glyph shapes are of substantially uniform macroscopic appearance, and
said spatial pattern is spatially periodic.

8. The method of claim 7 wherein
said glyph shapes are written on said recording medium at a sufficiently high spatial
density to impart a generally uniform, textured appearance to said code.

9-14. (Canceled).

15. (Amended) A method for storing digital values of predetermined bit length, n, in
a machine readable format on a hardcopy recording medium, said method comprising:

providing a hardcopy record, said hardcopy recording medium being encoded with a self-
clocking code composed of spatially distributed glyphs that are written on said recording medium
in a predetermined logical order in accordance with a predetermined spatial pattern for encoding
digital values of predetermined bit length, n, in the respective glyphs, said glyphs conforming to
selected ones of 2^n physically distinct, distinctive, rotationally variant, substantially equal surface
area, individually discriminable glyph shapes; and

copying said machine readable code on said hardcopy recording medium onto another
hardcopy recording medium.

16. (Canceled).

17. (Amended) A method for storing digital values of predetermined bit length, n, in a
machine readable format on a hardcopy recording medium, said method comprising:

providing a hardcopy record, said hardcopy recording medium being encoded with a self-clocking code composed of spatially distributed glyphs that are written on said recording medium in a predetermined logical order in accordance with a predetermined spatial pattern for encoding digital values of predetermined bit length, n, in the respective glyphs, said glyphs conforming to selected ones of 2^n physically distinct, distinctive, rotationally invariant, substantially equal surface area, individually discriminable glyph shapes; and

copying said machine readable code on said hardcopy recording medium onto another hardcopy recording medium.

18. (New) The method of claim 15, wherein said glyph shapes are defined by respective two dimensional pixel arrays of predetermined size, each of which contains a predetermined number of ON pixels and a predetermined number of OFF pixels, and said spatial pattern is spatially periodic.

19. (New) The method of claim 18, wherein said pixel arrays are written on said recording medium in spatially abutting relationship, such that said code has a generally uniform, textured appearance.

20. (New) The method of claim 15, wherein said glyph shapes are of substantially uniform macroscopic appearance, and said spatial pattern is spatially periodic.

21. (New) The method of claim 20, wherein said glyph shapes are written on said recording medium at a sufficiently high spatial density to impart a generally uniform, textured appearance to said code.

22. (Amended) A glyph code reader, comprising:
a scanner for scanning images on a hardcopy recording medium; and
a processor for isolating a glyph code image from the scanned images, said glyph code image comprising glyph shapes storing digital values of predetermined bit length, n, in a machine

readable format, in a self-clocking code, said glyph shapes being written on said recording medium in a predetermined logical order and in accordance with a predetermined spatial formatting pattern, each of said digital values being encoded in a corresponding one of 2^n physically distinct, distinctive, rotationally variant, substantially equal surface area, individually discriminable glyph shapes to generate a set of mutually independent glyph shapes that vary in accordance with said digital values, and for converting the glyph shapes into the digital values.

23. (Canceled).

24. (Amended) A glyph code reader, comprising:
a scanner for scanning images on a hardcopy recording medium; and
a processor for isolating a glyph code image from the scanned images, said glyph code image comprising glyph shapes storing digital values of predetermined bit length, n, in a machine readable format, in a self-clocking code, said glyph shapes being written on said recording medium in a predetermined logical order and in accordance with a predetermined spatial formatting pattern, each of said digital values being encoded in a corresponding one of 2^n physically distinct, distinctive, rotationally invariant, substantially equal surface area, individually discriminable glyph shapes to generate a set of mutually independent glyph shapes that vary in accordance with said digital values, and for converting the glyph shapes into the digital values.

25. (New) The reader of claim 22, wherein said glyph shapes are defined by respective two dimensional pixel arrays of predetermined size, each of which contains a predetermined number of ON pixels and a predetermined number of OFF pixels, and said spatial pattern is spatially periodic.

26. (New) The reader of claim 25, wherein said pixel arrays are written on said recording medium in spatially abutting relationship, such that said code has a generally uniform, textured appearance.

27. (New) The reader of claim 22, wherein said glyph shapes are of substantially uniform macroscopic appearance, and said spatial pattern is spatially periodic.

28. (New) The reader of claim 27, wherein said glyph shapes are written on said recording medium at a sufficiently high spatial density to impart a generally uniform, textured appearance to said code.